

*EFFECTS OF IMMEDIATE SELF-CORRECTION,
DELAYED SELF-CORRECTION, AND NO CORRECTION ON
THE ACQUISITION AND MAINTENANCE OF
MULTIPLICATION FACTS BY A FOURTH-GRADE
STUDENT WITH LEARNING DISABILITIES*

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This study compared the effects of immediate self-correction, delayed self-correction, and no correction on the acquisition and maintenance of multiplication facts by a fourth-grade student with learning disabilities. Data from daily and maintenance tests indicated that both correct response rate and accuracy were higher when self-correction was immediate rather than delayed or absent.

DESCRIPTORS: academic behavior, error correction, feedback, teaching

Instructional feedback, including error correction, is performance-based information that a learner receives following a response that completes a three-term learning trial (Heward, 1994). Simply providing feedback, however, although a necessary feature of effective instruction, is not sufficient if its timing allows errors to be repeated (Van Houten, 1980).

Previous research has examined the effects of the timing of error correction when it is delivered by the teacher (Barbetta, Heward, Bradley, & Miller, 1994). This investigation extends previous research by analyzing the effects of the timing of self-correction on the

acquisition and maintenance of multiplication facts and by examining error patterns under different error-correction conditions to determine whether error repetition is responsible for the observed differences.

METHOD

Learner and Setting

This study was conducted in a special education classroom in a rural elementary school. The learner, a 9-year-old fourth-grade girl who had been classified as learning disabled, tested at the second-grade level on the Metropolitan Achievement Test for arithmetic skills.

Dependent Variable

An alternating treatments design was used to analyze the effects of the timing of self-correction on (a) the number of correct responses per minute, (b) mean accuracy, and (c) the percentage of errors repeated. Data were obtained from eight five-item tests each day. Number of correct responses per minute

This report is based on a study conducted by the first author during a field experience before student teaching as part of the Bachelor of Science in Education requirements in Special Education at Plattsburgh State University of New York.

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was calculated by dividing the number of correct responses by the amount of time taken to complete each test, not including elapsed time for self-corrections. A repeated error was recorded each time the learner made a subsequent error on an item that had previously been incorrect during that day's testing session.

Interobserver Agreement

All tests were scored by two individuals for number of facts answered correctly or incorrectly and learner compliance with self-correction procedures. Agreement was determined by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Mean agreement was 99% (range, 99% to 100%).

General Procedure

Experiment 1. Ten single-digit multiplication facts with a multiplier of 3 (3×0 through 9) were taught under two conditions. In the no-correction condition, errors were not corrected. In the immediate self-correction condition, the learner corrected her work immediately following the completion of each of the four five-item tests.

Experiment 2. Experiment 2 was conducted 1 week after the conclusion of Experiment 1. Ten single-digit multiplication facts with a multiplier of 6 (6×0 through 9) were taught under two conditions. An immediate self-correction condition, as defined in Experiment 1, was compared to a delayed self-correction condition in which the learner corrected the four five-item tests assigned to this condition after all had been completed.

Instruction. The teacher (first author) presented 10 individual multiplication-fact cards to the learner in random order. The learner was shown a card and was prompted to respond (e.g., "What is 3×3 ?"). A correct response within 3 s was praised (e.g.,

"That's correct, 3×3 is 9"). An incorrect response or no response within 3 s was corrected (e.g., " 3×3 is 9") and was followed by a prompt to respond again (e.g., "What is 3×3 ?"). After each of the 10 fact cards had been presented and responses had been praised or corrected once in this manner, the cards were shuffled and each card was presented a second time, concluding the instructional session.

Daily tests. Immediately following each day's instructional session, the learner completed a total of eight five-item multiplication-fact tests. Four of the tests contained the five even-multiplicand (E) facts, and the other four tests contained the five odd-multiplicand (O) facts taught that day. Odd-multiplicand facts and even-multiplicand facts were assigned to the immediate self-correction condition in Experiments 1 and 2, respectively. The order of the facts assigned to each test condition was varied across each day's series of tests.

Test conditions were not intentionally counterbalanced by the experimenters. Each day the learner chose to do the O or the E tests first but was unaware of what the O and E represented. The learner's selections resulted in a varied order of error-correction conditions across days.

Self-correction. During the immediate and delayed correction conditions, the learner self-corrected her work using answer keys. The learner circled each error, then immediately wrote the correct answer below each circled response.

Maintenance tests. The content, format, and administration of maintenance tests were the same as the daily tests except that no correction or feedback was provided to or by the learner. Two maintenance tests were administered for Experiment 1 at 2 and at 3 weeks after daily instruction and testing sessions had been discontinued. One maintenance test was administered 2 weeks after the conclusion of Experiment 2.

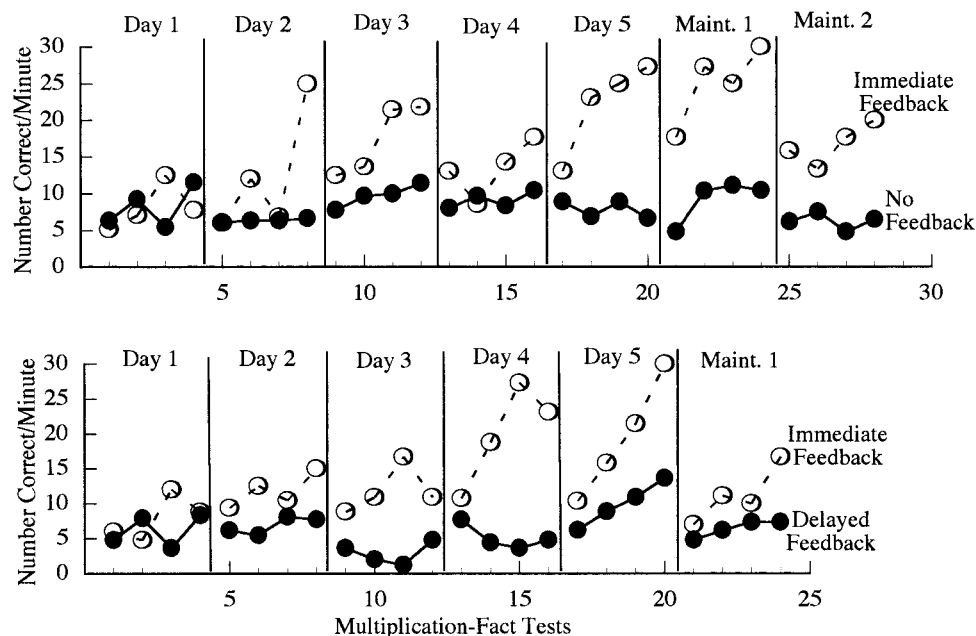


Figure 1. Number of problems answered correctly per minute on daily and maintenance multiplication fact tests for Experiment 1 (top panel) and Experiment 2 (bottom panel). Maint. = maintenance test.

RESULTS AND DISCUSSION

The number of facts answered correctly per minute was higher when self-correction was immediate rather than delayed or absent (see Figure 1). Mean accuracy data for all daily and maintenance tests in Experiment 1 was 93% (range, 85% to 100%) and 88% (range, 80% to 95%) for the immediate self-correction and no-correction conditions, respectively. Mean accuracy in Experiment 2 was 95% (range, 90% to 100%) and 76% (range, 55% to 90%), respectively, when self-correction was immediate rather than delayed.

In Experiment 1, of the seven total errors on all daily tests in the immediate feedback condition, two were repeated (29%); of the 12 total errors in the no-feedback condition, six were repeated (50%). In Experiment 2, of the five total errors on all daily tests in the immediate feedback condition, one was repeated (20%); of the 24 total errors in the delayed feedback condition, nine were repeated (38%).

The results of this study may be attributed to different temporal relationships between responses to sets of facts and the delivery of self-correction under the three error-correction conditions. In the immediate self-correction condition, although the learner did not self-correct following each response, she did correct errors in each grouping of facts before her next opportunity to respond to those same facts again. In the delayed condition, self-correction occurred after completing all four tests (or did not occur at all in the no-correction condition), setting the occasion for the same errors to be emitted on subsequent tests.

Accuracy was essentially equivalent across the different sets of facts during instructional sessions at the beginning of the study, but as the investigation progressed, there were relatively fewer errors on facts assigned to the immediate self-correction condition. The relatively stable response rates on daily tests when self-correction was delayed or absent suggest that the daily instructional ses-

sions had little effect on test performance. This may be due in part to differences in active student responding (self-correction) versus passive attending (teacher correction), different sources and forms of correction (teacher verbal vs. student visual or written), or different response modalities (written vs. verbal) during testing and instructional sessions, respectively. Future research should investigate these relationships.

The results of this study should be viewed within the following limitations. During the 2-week period between the final instructional session and the first maintenance check, the student completed multiplication-fact worksheets that were unrelated to the procedures of this study, as part of her day-to-day class routine. The brevity of the experiment limits conclusions about the generalized effects of immediate self-correction

across sessions and merits additional research.

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